

REGIONAL COMPETITION - ROUND 8

TOSS-UP

1. MATH; Multiple Choice: If $ad = bc$, then, for non-zero values, which of the following is always true?
- a) $b/c = d/a$
 - b) $b/a = d/c$
 - c) $a/d = b/c$
 - d) None of the above

ANSWER: B-- $B/A = D/C$

BONUS

1. MATH; Multiple Choice: What is the prefix for 10 to the negative 15th power?
- a) Femto
 - b) Milli
 - c) Extro
 - d) Giga

ANSWER: A--FEMTO

TOSS-UP

2. PHYS; Short Answer: What is the name of the device used to measure voltage without drawing ANY current from the circuit being measured?

ANSWER: A POTENTIOMETER

BONUS

2. PHYS; Multiple Choice: An electric charge moving through a magnetic field experiences an acceleration:
- a) along the direction of motion
 - b) that enhances the effect of the magnetic field
 - c) perpendicular to the direction of motion
 - d) that reduces the effect of the magnetic field

ANSWER: C--PERPENDICULAR TO THE DIRECTION OF MOTION

TOSS-UP

3. BIOL; Short Answer: What is the largest gland in the human body?

ANSWER: THE LIVER

BONUS

3. BIOL; Multiple Choice: Social behavior among bees is defined in part as the sharing of work with different individuals performing different jobs. Control of the colony by the queen is maintained by:
- a) pheromones
 - b) agnostic behavior
 - c) small colony size
 - d) limiting food distribution

ANSWER: A--PHEROMONES

TOSS-UP

4. CHEM: Short Answer: What is another name for the element wolfram?

ANSWER: TUNGSTEN

BONUS

4. CHEM: Short Answer: What two elements make up the alloy "white gold"?

ANSWER: GOLD AND PLATINUM

TOSS-UP

5. COMP; Short Answer: What was the first documented computer bug?

ANSWER: A MOTH FOUND IN ONE OF THE RELAYS OF ONE OF THE EARLIEST ELECTRO-MECHANICAL COMPUTERS (ENIAC)

BONUS

5. COMP; Short Answer: Who found the first documented computer bug?

ANSWER: GRACE HOPPER

TOSS-UP

6. BIOL; Short Answer: What is the hardest substance in the human body?

ANSWER: TOOTH ENAMEL (ACCEPT ENAMEL)

BONUS

6. BIOL; Short Answer: What is the longest bone in the human body?

ANSWER: THE FEMUR

TOSS-UP

7. PHYS; Multiple Choice: A thin double-concave lens produces images which are:
- a) larger than the object
 - b) smaller than the object
 - c) the same size as the object
 - d) one cannot tell from this information

ANSWER: B--SMALLER THAN THE OBJECT

BONUS

7. PHYS; Multiple Choice: Which of the following are the parts of a DC generator that convert the AC in the armature to DC in the external circuit?
- a) field poles
 - b) slip rings and the brushes
 - c) commutator and the brushes
 - d) armature and the core

ANSWER: C--COMMUTATOR AND THE BRUSHES

TOSS-UP

8. CHEM; Short answer: In the water-gas catalytic process, what is reacted with water to produce carbon dioxide and hydrogen?

ANSWER: CO OR CARBON MONOXIDE

BONUS

8. CHEM: Short answer: In the methanation reaction, what is the molar ratio of carbon monoxide to hydrogen in the production of methane and water?

ANSWER: 1 MOLE OF CARBON MONOXIDE TO 3 MOLES OF HYDROGEN

TOSS-UP

9. ASTR; Multiple Choice: NASA's Cosmic Background Explorer (COBE) has recently provided evidence for:
- a) the Steady-State Universe
 - b) the Big Bang
 - c) the curvature of space
 - d) the existence of extraterrestrial life

ANSWER: B--THE BIG BANG

BONUS

9. ASTR; Short Answer: What is the only planet besides Earth to have only one known moon?

ANSWER: PLUTO

TOSS-UP

10. PHYS; Short Answer: What are the charge carriers called in a P-type semiconductor?

ANSWER: HOLES

BONUS

10. PHYS; Short Answer: What does the photomultiplier tube in a scintillation counter multiply?

ANSWER: ELECTRONS

TOSS-UP

11. CHEM; Short answer: What are the three principal fossil fuels?

ANSWER: COAL, PETROLEUM (OR OIL), NATURAL GAS

BONUS

11. CHEM; Short answer: Fossil fuels consist mainly of carbon and hydrogen; the proportion of carbon is the highest in which of the three principal fuels?

ANSWER: COAL

TOSS-UP

12. BIOL; Short Answer: One of the bones in the human body is nicknamed the funny bone. Why is it so called?

ANSWER: IT IS THE HUMERUS

BONUS

12. BIOL; Short Answer: Which animal's fleece yields lanolin?

ANSWER: THE SHEEP

TOSS-UP

13. ERSC; Short Answer: What is the name of the robot, built at Carnegie Mellon University, that is designed to explore the cone of an active volcano?

ANSWER: DANTE

BONUS

13. ERSC; Multiple Choice: Most geologists agree that a sizable comet or a small asteroid struck the Yucatan coast at the same geological instant as the last of the dinosaurs disappeared 65 million years ago. Until recently, the diameter of the buried crater was thought to be about 180 kilometers. New evidence indicates the crater diameter may be:
- a) 1000 km
 - b) 500 km
 - c) 300 km
 - d) 100 km

ANSWER: C--300 KM

TOSS-UP

14. CHEM; Short Answer: What is the name of the concentration unit which is defined as the number of moles of solute per kilogram of solvent?

ANSWER: MOLALITY

BONUS

14. CHEM; Multiple Choice: What, in general, can be said about the atomic radius and the first ionization energy of an element as you move down a group in the Periodic Table?
- a) both the atomic radius and the first ionization energy increase
 - b) the atomic radius decreases and the first ionization energy increases
 - c) the atomic radius increases and the first ionization energy decreases
 - d) both the atomic radius and the first ionization energy increase

ANSWER: C--THE ATOMIC RADIUS INCREASES AND THE FIRST IONIZATION ENERGY DECREASES

TOSS-UP

15. PHYS; Short Answer: How many colors of quarks are believed to exist?

ANSWER: THREE (3)

BONUS

15. PHYS; Short Answer: When a fast charged particle traverses a dielectric medium at a velocity exceeding the velocity of light in that medium, radiation is emitted. This radiation is named after which scientist?

ANSWER: CERENKOV (RADIATION) (PRON. CHREN-COUGH)

TOSS-UP

16. BIOL; Short Answer: What is the most common fowl on Earth?

ANSWER: THE CHICKEN

BONUS

16. BIOL; Short Answer: What is a dactylogram?

ANSWER: A FINGERPRINT

TOSS-UP

17. CHEM; Short answer: What happens to a liquid when its vapor pressure slightly exceeds the pressure above it?

ANSWER: IT BOILS (DO NOT ACCEPT EVAPORATES)

BONUS

17. CHEM; Short answer: The properties of a solution may differ considerably from those of a pure solvent. What type of properties depends primarily on the concentration of solute particles rather than their nature?

ANSWER: COLLIGATIVE PROPERTIES

TOSS-UP

18. MATH; Short Answer: Four hundred people attending a party are each given a number, 1 to 400. What is the probability that a number called at random ends in 9?

ANSWER: 1/10

BONUS

18. MATH; Short Answer: Jo, Lucy, and Tom are playing a game. Each places a penny flat on a table, in successive turns: Jo, Lucy, Tom, Jo, Lucy, Tom and so on. The player who puts the last penny wins. If it take 998 pennies to cover the table, who wins, Jo, Lucy or Tom?

ANSWER: LUCY, BECAUSE $998 \pmod{3} = 2$

TOSS-UP

19. ASTR; Multiple Choice: What property is used to measure the distance to the stars closest to the sun?
- a) temperature
 - b) diameter
 - c) parallax
 - d) recessional velocity

ANSWER: C--PARALLAX

BONUS

19. ASTR; Multiple Choice: The difference between the calculated mass of the milky way and the observed mass arose from the work of:
- a) Johannes Kepler
 - b) Edwin Hubble
 - c) Jan Oort
 - d) Carl Siefert

ANSWER: C--JAN OORT

TOSS-UP

20. BIOL; Multiple Choice: In some plants and in nearly all animals, the formation of eggs and sperm is the direct result of what cellular process?
- a) mitosis
 - b) meiosis
 - c) osmosis
 - d) phagocytosis

ANSWER: B--MEIOSIS

BONUS

20. BIOL; Multiple Choice: Meiosis results in which of the following?
- a) single division of the nucleus accompanied by a single replication of the chromosomes
 - b) two divisions of the nucleus accompanied by a single replication of the chromosomes
 - c) two divisions of the nucleus accompanied by a dual replication of the chromosomes
 - d) two divisions of the nucleus accompanied by a triple replication of the chromosomes

ANSWER: B--TWO DIVISIONS OF THE NUCLEUS ACCOMPANIED BY A SINGLE REPLICATION OF THE CHROMOSOMES

TOSS-UP

21. GENR; Multiple Choice: Which of the following household items can be used to put out a common grease fire?
- a) table salt
 - b) water
 - c) flour
 - d) baking soda

ANSWER: D--BAKING SODA

BONUS

21. GENR; Multiple Choice: It is generally bad practice to use a screw of one kind of metal to connect parts of other kinds of metals because:
- a) the connection causes a type of battery producing corrosion
 - b) the screw will be weaker than the other material and the connection will be unreliable
 - c) the screw will work its way out of the material
 - d) the material will buckle in spaces between the screws

ANSWER: A--THE CONNECTION CAUSES A TYPE OF BATTERY PRODUCING CORROSION

TOSS-UP

22. ERSC; Multiple Choice: Until recently, most paleontologists thought that the Cambrian explosion of evolutionary innovation lasted about 40 million years. New evidence from Siberia puts the time duration at about:
- a) 5 to 10 million years
 - b) 1 to 2 million years
 - c) 100 million years
 - d) 500 thousand years

ANSWER: A--5 TO 10 MILLION YEARS

BONUS

22. ERSC; Multiple Choice: What percentage of the Earth's total volume of ice is in Antarctica?
- a) 90%
 - b) 80%

- c) 70%
- d) 60%

ANSWER: A--90%

TOSS-UP

23. PHYS; Short Answer: An incident ray comes in parallel to the principal axis of a concave mirror. Where does it cross the axis after it is reflected?

ANSWER: AT THE FOCAL POINT

BONUS

23. PHYS; Short Answer: Suppose the power of a prescription lens is 5 diopters. What is the focal length of the lens?

ANSWER: 20 CENTIMETERS (ACCEPT 0.20 METERS)

TOSS-UP

24. COMP; Multiple Choice: The maximum distance an electron can travel in a nanosecond is approximately how far?

- a) 1.5 in.
- b) 18 in.
- c) 11.5 in.
- d) 36 in.

ANSWER: C--11.5 IN.

BONUS

24. COMP; Short Answer: What is the decimal equivalent of the hexadecimal number 10?

ANSWER: 16

TOSS-UP

25. GENR; Short Answer: What is the science of tree ring dating called?

ANSWER: DENDROCHRONOLOGY

BONUS

25. GENR; Short Answer: The Draper award in engineering is equivalent to the Nobel Prize. Name either of the two winners of the first Draper award for their co-invention of the integrated circuit.

ANSWER: NOYCE OR KILBY
